

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

1.-34. (Cancelled)

35. (Currently Amended) A method for selecting an endpoint indicator in plasma processing, the method comprising:

providing at least a first RF signal having a first fundamental frequency and a second RF signal having a second fundamental frequency at least one frequency;

etching, in a plasma processing chamber, at least one sample substrate using the first RF signal and the second RF signal at the at least one frequency;

determining at least one calibrating endpoint by performing an empirical analysis on the at least one sample substrate;

etching, in the plasma processing chamber, at least one test substrate using the first RF signal and the second RF signal at the at least one frequency, the at least one test substrate being etched beyond the at least one calibrating endpoint;

measuring a plurality of parameters at least one parameter over at least one time range when etching the at least one test substrate, the at least one time range including the at least one calibrating endpoint;

comparing data pertaining to at least a first plurality of harmonics for the plurality of parameters and a second plurality of harmonics for the plurality of parameters, the first plurality of harmonics representing frequency harmonics of said first fundamental frequency and the second plurality of harmonics representing harmonics of the second fundamental frequency, the data pertaining to at least sensitivity of the first plurality of harmonics for the plurality of parameters and the second plurality of harmonics for the plurality of parameters responsive to the at least one calibrating endpoint a plurality of harmonics for the at least one parameter, the data pertaining to the at least one calibrating endpoint; and

selecting the endpoint indicator based on the comparing, the endpoint indicator including a selected harmonic for a selected one of the first fundamental frequency and the

~~second fundamental frequency for a select parameter of said plurality of parameters-a
harmonic for a parameter from the plurality of harmonics for the at least one parameter.~~

36. (Currently Amended) The method of claim 35 wherein the at least one time range is predefined and is less than a time duration required to etch the test substrate, ~~the endpoint indicator is the harmonic for the parameter, the endpoint indicator to be used for the plasma processing at a given frequency of the at least one frequency.~~

37. (canceled).

38. (Currently Amended) The method of claim 35 wherein ~~the wherein the empirical~~ analysis includes a scanning electron microscopy analysis.

39. (Currently Amended) The method of claim 35 wherein ~~the at least one select~~ parameter ~~includes at least~~ represents one of current, voltage, and phase.

40. (canceled).

41. (Currently Amended) The method of claim 35 wherein ~~the at least one select~~ parameter is measured at one or more of an upper electrode and a lower electrode of a system for the plasma processing.

42. (Currently Amended) The method of claim 35 wherein ~~the at least one select~~ parameter is measured at both of an upper electrode and a lower electrode of a system for the plasma processing.

43. (Canceled).

44. (Previously Presented) The method of claim 35 further comprising verifying the endpoint indicator by performing a further empirical analysis.

45. (Currently Amended) A method for detecting an endpoint in plasma processing that employs a plurality of RF signals having a plurality fundamental frequencies at a given frequency, the method comprising:

etching a sample substrate using the plurality of RF signals at a given frequency;
determining a calibrating endpoint by performing an empirical analysis on an etched location of the sample substrate;

etching at least one test substrate at the given frequency using the plurality of RF signals, the at least one test substrate ~~substrate~~ being etched beyond the calibrating endpoint;

measuring a plurality of parameters at least one parameter over a time range when processing the at least one test substrate, the time range including the calibrating endpoint;

comparing data pertaining to a plurality of harmonics of the plurality of fundamental frequencies for the plurality of parameters ~~for the at least one parameter~~, the data pertaining to the calibrating endpoint;

selecting a given harmonic of a given fundamental frequency for a given parameter from the plurality of harmonics of the plurality of fundamental frequencies for the plurality of parameters as an endpoint indicator based on the comparing, wherein a signal representing the harmonic of the given fundamental frequency for the given parameter is selected from the plurality of harmonics of the plurality of fundamental frequencies for the plurality of parameters as being the signal with the most discernible response pertaining to said calibrating end point ~~selecting a harmonic for a parameter from the plurality of harmonics for the at least one parameter as an endpoint indicator based on the comparing~~;

setting at least one criterion pertaining to the given harmonic of the given fundamental frequency for the given parameter for indicating the endpoint ~~harmonic for the parameter for indicating the endpoint~~;

etching a production substrate at the given frequency;
monitoring the given harmonic of the given fundamental frequency for the given parameter when etching the production substrate; and
signaling the endpoint when the at least one criterion is met

46. (Currently Amended) The method of claim 45 wherein the given at least one parameter represents ~~includes~~ at least one of current, voltage, and phase.

47. (Currently Amended) The method of claim 45 wherein the at least one criterion includes presence of a trough in a waveform of the given harmonic of the given fundamental frequency for the given parameter.
48. (Currently Amended) The method of claim 45 wherein the monitoring includes measuring the given parameter at one or more of an upper electrode and a lower electrode of a system for the plasma processing.
49. (Currently Amended) The method of claim 45 wherein the monitoring includes measuring the given parameter at both of an upper electrode and a lower electrode of a system for the plasma processing.
50. (New) The method of claim 45 wherein the time range is predefined and is less than a time duration required to etch the at least one test substrate.